
Citation:

Hanley, B and Bissas, A and Drake, A (2009) Gait parameter differences between the legs during race walking. In: BASES Annual Conference, London, UK.

Link to Leeds Beckett Repository record:

<https://eprints.leedsbeckett.ac.uk/id/eprint/796/>

Document Version:

Conference or Workshop Item (Other)

The aim of the Leeds Beckett Repository is to provide open access to our research, as required by funder policies and permitted by publishers and copyright law.

The Leeds Beckett repository holds a wide range of publications, each of which has been checked for copyright and the relevant embargo period has been applied by the Research Services team.

We operate on a standard take-down policy. If you are the author or publisher of an output and you would like it removed from the repository, please [contact us](#) and we will investigate on a case-by-case basis.

Each thesis in the repository has been cleared where necessary by the author for third party copyright. If you would like a thesis to be removed from the repository or believe there is an issue with copyright, please contact us on openaccess@leedsbeckett.ac.uk and we will investigate on a case-by-case basis.

Introduction

Race walking is a highly technical event in which the athlete attempts to complete the race as quickly as possible while observing specific technical rules. Race walking is a unique event in athletics as it is the only event to have specific rules about joint angles (the advancing leg must be straightened from the moment of first contact with the ground until the vertical upright position). It is therefore important that athletes maintain correct technique with both legs throughout. Prior research on the effects of fatigue during race walking has shown changes in step length and frequency (Knicker & Loch, 1990). It is unclear whether these changes are consistent for both legs.

Purpose

The purpose of the study was to investigate the differences between the legs for kinetic variables during race walking, and to measure changes occurring due to fatigue.

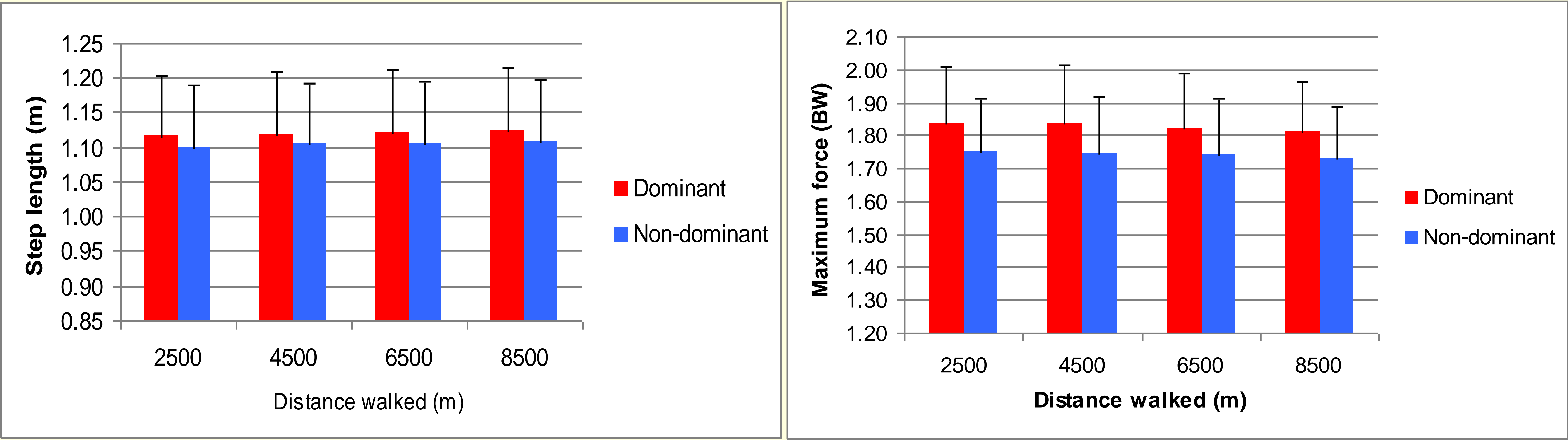


Methods

Fourteen competitive race walkers (ten male, four female) gave informed consent and the study was approved by the University's ethics committee. All participants were free from injury. The participants' mean age was 28.2 yrs (± 7.4) stature 1.77 m ($\pm .10$), and mass 66.0 kg (± 11.7). Their personal best times for the 10 km race ranged from 40 to 50 minutes. Each participant walked for 10 km on a treadmill (Gaitway, Traunstein) at a pace that resulted in a running time equivalent to 105% of their personal best time. The average treadmill speed was 12.4 km/hr ($\pm .7$). Data were recorded at 1000 Hz using the Gaitway treadmill, which has two in-dwelling force plates (Kistler, Winterthur). Data were collected for thirty seconds at four times during the walk, at 2500 m, 4500 m, 6500 m, and 8500 m of total distance walked. Statistical analysis consisted of repeated measures ANOVA with pairwise comparisons using Bonferonni adjustments.

Results

Walking speed is the product of step frequency and step length. When expressed as a percentage, mean step length was 63% of overall stature, with a range between 57 and 69%. There was a significant difference between the legs for first peak force ($P = .001$), weight acceptance rate ($P = .002$), and push-off rate ($P = .001$), although these differences did not change significantly with distance walked. There was also a significant difference between the legs' step lengths ($P = .001$), midsupport forces ($P = .009$), and propulsive force peaks ($P = .001$); the overall values for these variables also increased significantly with distance walked ($P < .001$, $P = .009$, and $P < .001$ respectively). However, there was no effect of distance on the differences between the legs for any variable.



Discussion

There were a number of changes evident in the gait parameters measured during the course of the walk. The results also showed significant leg dominance for important gait variables such as step length. This difference is possibly due to strength imbalances as suggested by the significant differences between the legs for propulsive force and push-off rate. The differences between legs may be increased in race situations as the pace is faster, especially at the start. Athletes should be aware that the imbalances caused by leg dominance may need rectification to prevent injury and maintain efficient walking technique. The imbalances did not appear to worsen with the onset of fatigue although this may occur over the longer championship distances of 20 and 50 km.

References

Knicker, A. & Loch, M. (1990). *New Studies in Athletics*, 5, pp.25-38